Space Weather Forecast

Issued on Saturday, 16 March 2024 at 12:42 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Continuation of Minor Solar Radiation Storm S1 a decreasing risk over current UTC weekend.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been low. The 24-hour period started with the tail end of a long period Common-class X-ray flare (that peaked prior to this reporting period at 15/0610UTC) from a large sunspot region over the western solar horizon. Activity was otherwise very subdued, with isolated very small Common-class flares on a smooth background.

The current disc comprises a relatively stable set of relatively few sunspot groups, with all of these apparently magnetically simple.

The main events noted in the period included a possible 'filament lift-off' in the north centre around 16/0600UTC, perhaps occurring at the same time as a smaller event narrowly in the southeast between 0600-0900UTC, with both visible on extreme UV imagery, and perhaps faintly in ground-based near-infrared observatory images. Any resulting ejecta has yet to materialise on other satellite imagery, however this is a main aspect of monitoring given the emission locations near the middle of the Sun. Confirmed CME activity otherwise largely appeared to emanate from narrowly behind the southeastern solar horion. All considered, there is no imagery to suggest new Earth-bound CMEs at the time of writing.

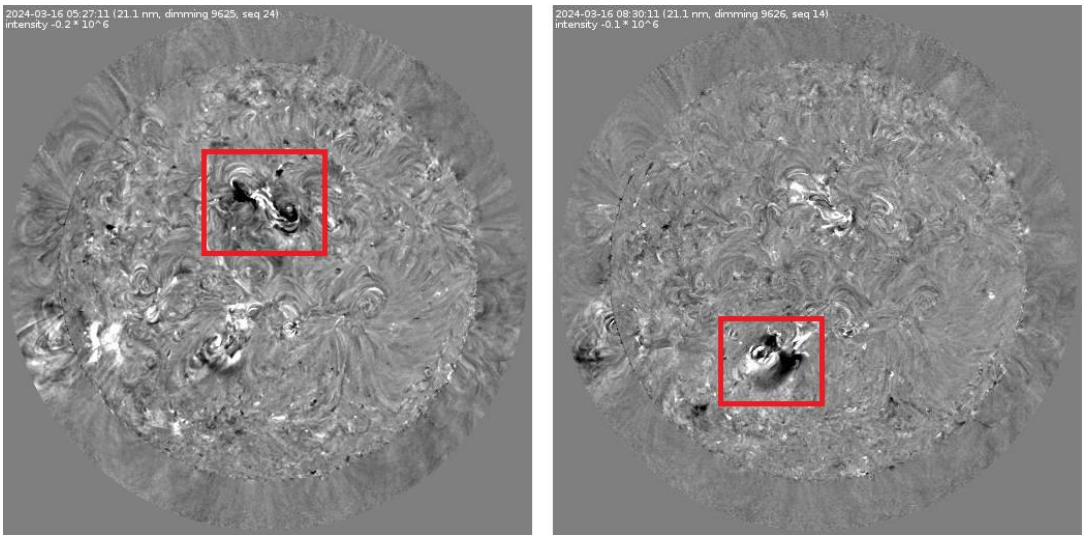

Figure 1: SIDC ROB-processed extreme UV time integrated ‘coronal dimmings’ of note in the past 24 hours, showing two potential CME-generating events near the middle of the Sun. The left event is more visible in extreme UV, and the right in near infra-red. Confirmatory satellite imagery for any CMEs is pending.

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Solar Wind / Geomagnetic Activity: Solar wind speeds were perhaps reflective of a slow exit from the fast wind regime of a coronal hole. The solar wind speed showed a roughly level trend between Slightly Elevated and Background levels. The number of particles in the solar wind was level and within long-term background, while the associated magnetic field showed a very slight decline. The north-south component of this field was within typical levels and showed an erratic character and slight co-aligned bias with the Earth's field (helping to limit any geomagnetic effects).

The net result of the above solar wind measures was for provisionally quiet geomagnetic activity throughout.

Energetic Particles / Solar Radiation: Solar radiation levels showed a continuing enhancement beyond Minor Solar Radiation Storm S1 (starting at 10pfu) in the wake of the 15/0610UTC Common-class X-ray flare from the large sunspot over the western solar horizon. This level was first breached from 15/2050UTC and reached a maximum of 18.8pfu at 16/0905UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: There is rising slight chance of Moderate-class activity as a result of a potentially large returning sunspot region due over the eastern solar horizon later in the current UTC weekend.

Solar Wind / Geomagnetic Activity: There are up to three glancing incidence CME shocks expected to pass the radius of Earth's orbit around 17 or 18 March. Combined with any minor fast wind which is due at a similar time, all considered there is a peak slight chance of Minor Geomagnetic Storm G1 on these days, else starting and ending the four-day period more reliably quiet. Note that no potential CMEs from the current UTC day are included in the above forecast.

Energetic Particles / Solar Radiation: Solar radiation levels are likely to remain in excess of S1 for much of the remainder of the current UTC day, but should fall below by the second half of the UTC weekend and continue its declining trend thereafter - in the expected absence of potent sunspot regions in geoeffective locations should they flare appropriately.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	10	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

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Radio Blackouts - X Ray Flares:

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	10	20	20	20
Very Active	R3 to R5 X	No	1	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	99	20	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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